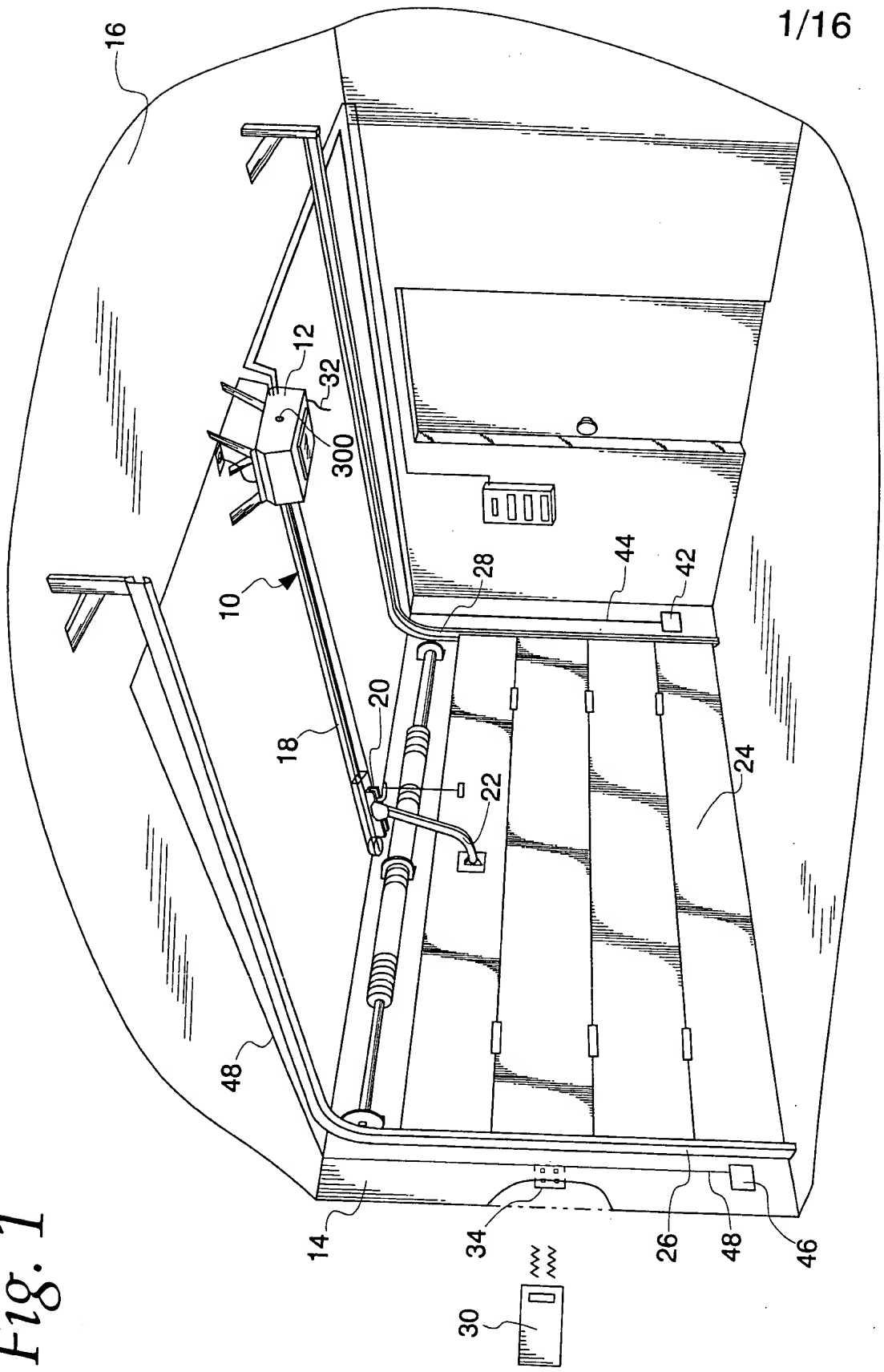


Fig. 1

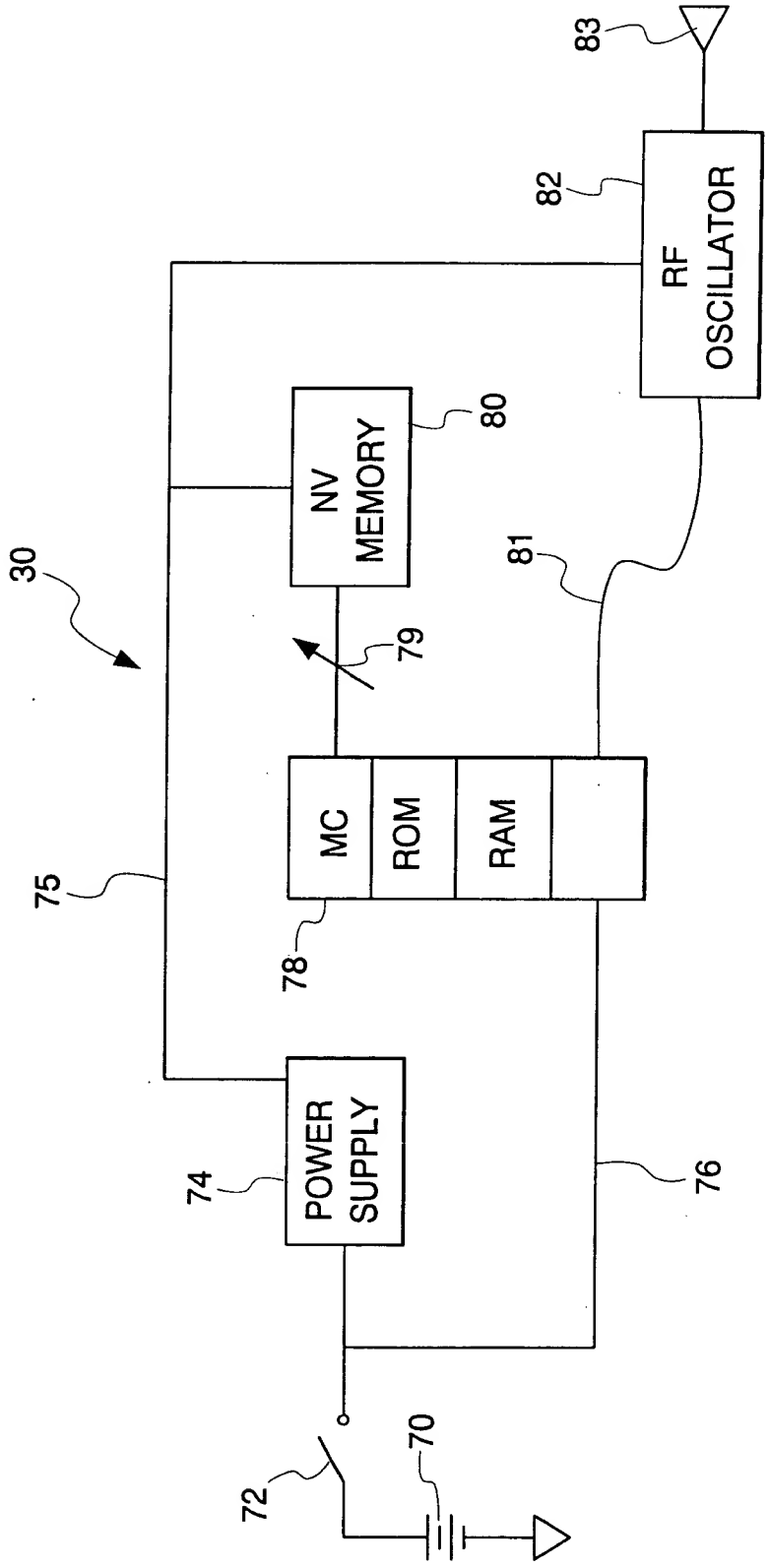

83
82
RF
OSCILLATOR
80
NV
MEMORY
30
81
79
MC
ROM
RAM
75
78
74
POWER
SUPPLY
76
72
70

Fig. 2

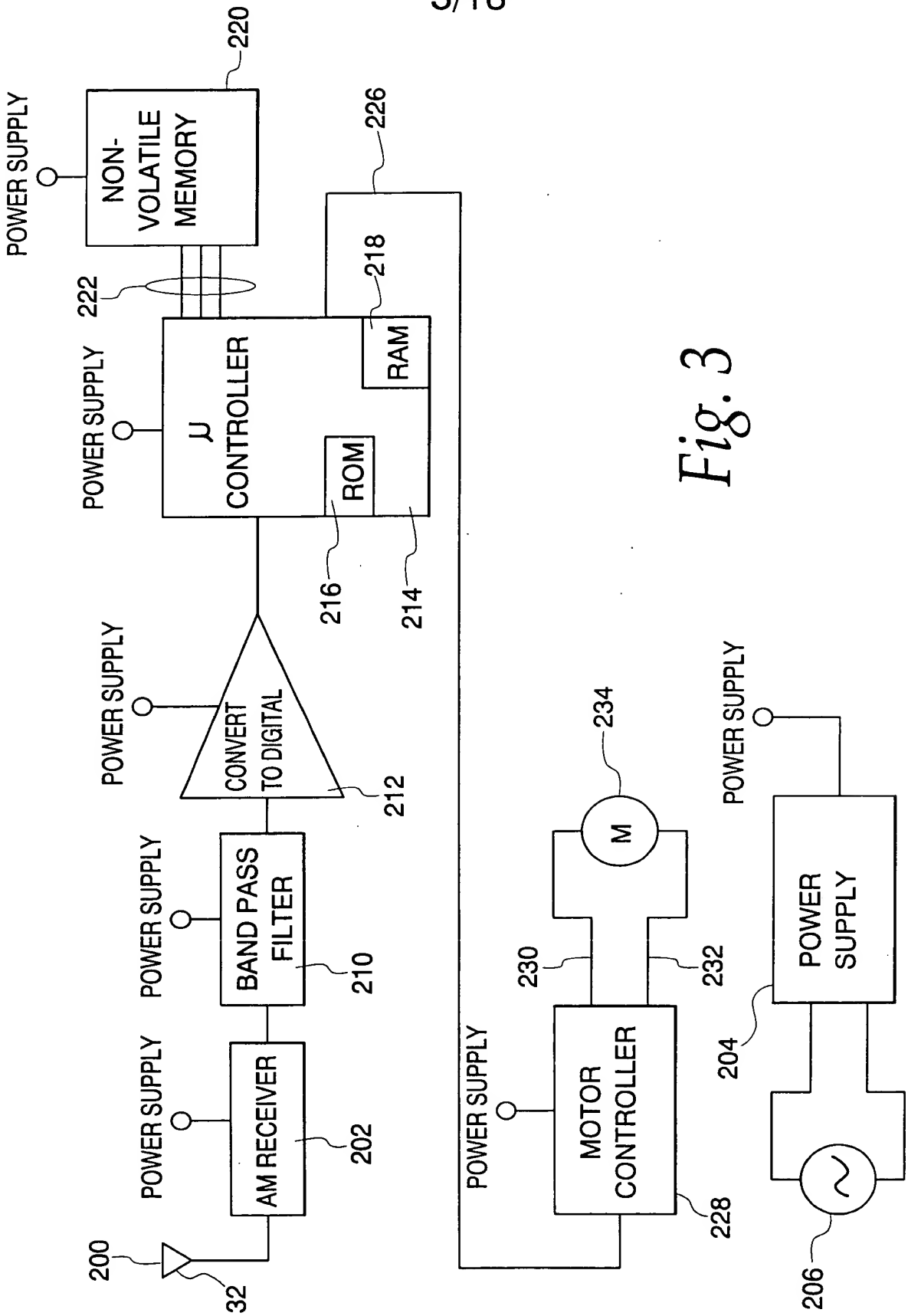

POWER SUPPLY
NON-VOLATILE MEMORY
220
222
POWER SUPPLY
μ CONTROLLER
RAM
ROM
218
226
216
214
POWER SUPPLY
CONVERT TO DIGITAL
212
POWER SUPPLY
BAND PASS FILTER
210
POWER SUPPLY
AM RECEIVER
202
200
32
234
M
230
232
POWER SUPPLY
MOTOR CONTROLLER
228
POWER SUPPLY
POWER SUPPLY
204
206

Fig. 3

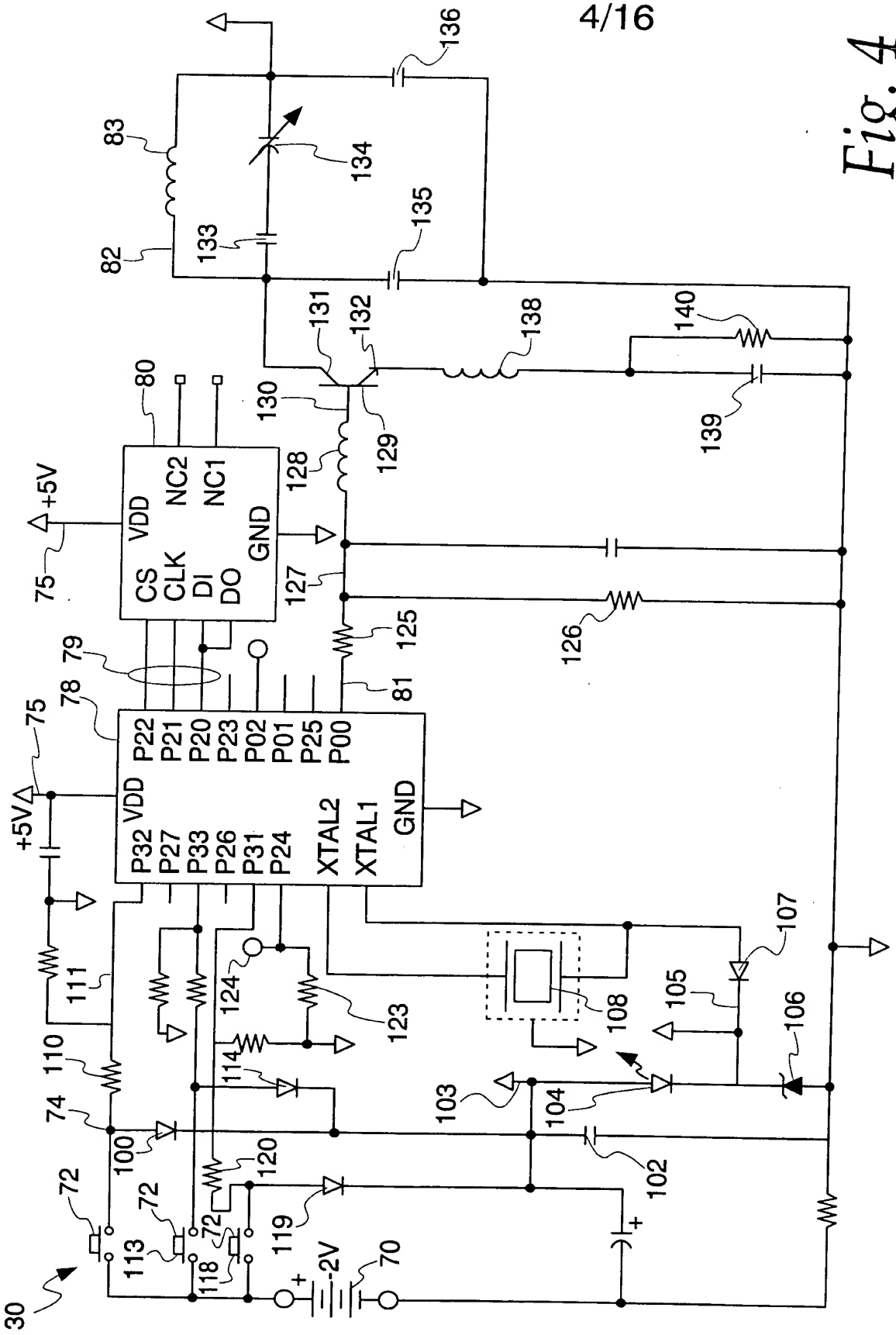

83
82
133
134
135
136
131
132
138
140
139
130
129
128
80
+5V
75
VDD
NC2
NC1
CS
CLK
DI
DO
GND
127
125
126
79
78
81
P22
P21
P20
P23
P02
P01
P25
P00
P32
P27
P33
P26
P31
P24
XTAL2
XTAL1
111
124
123
108
107
105
106
110
114
103
104
74
100
120
102
72
113
118
119
-2V
70
30

Fig. 4

Fig. 5A
Fig. 5B

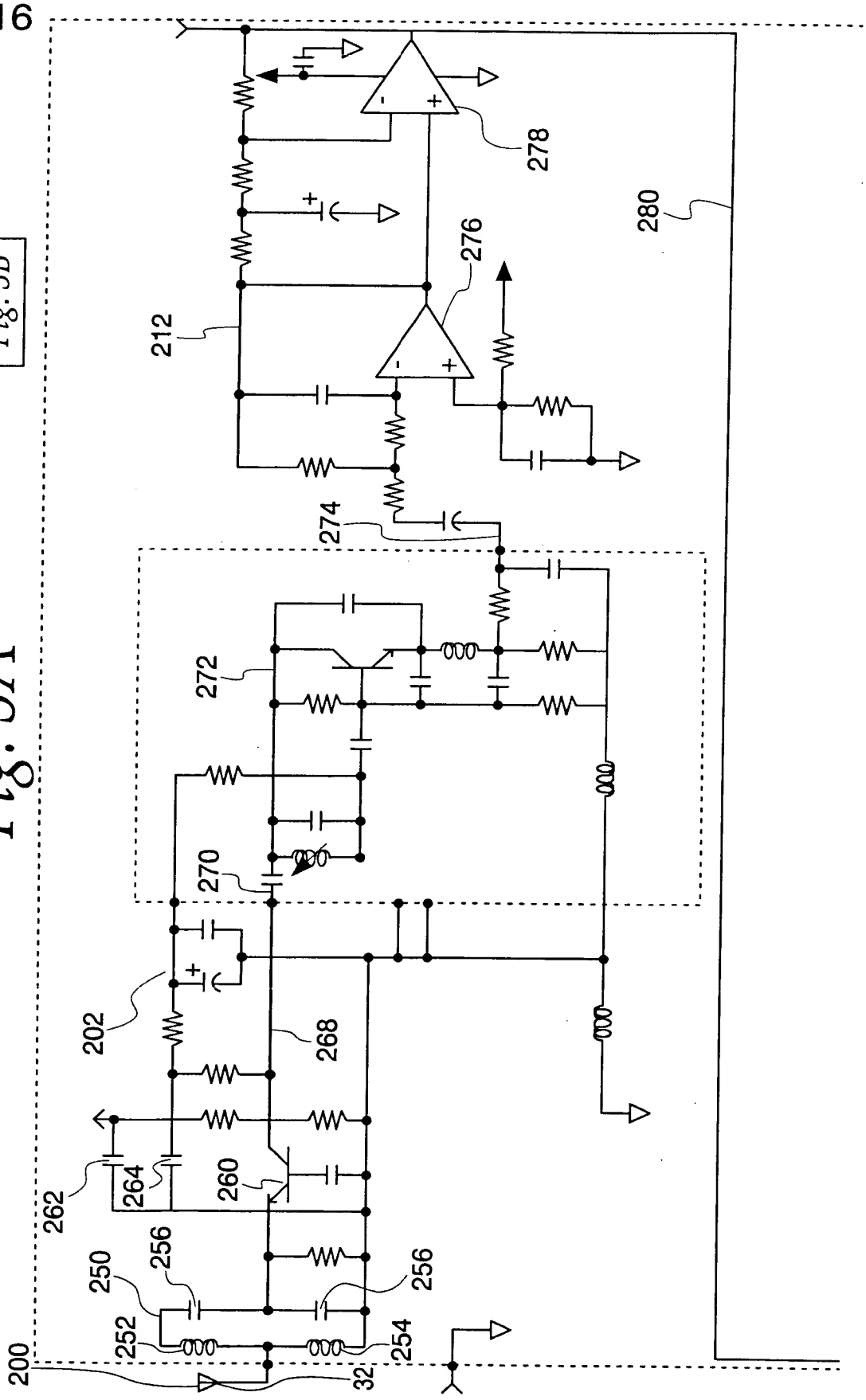
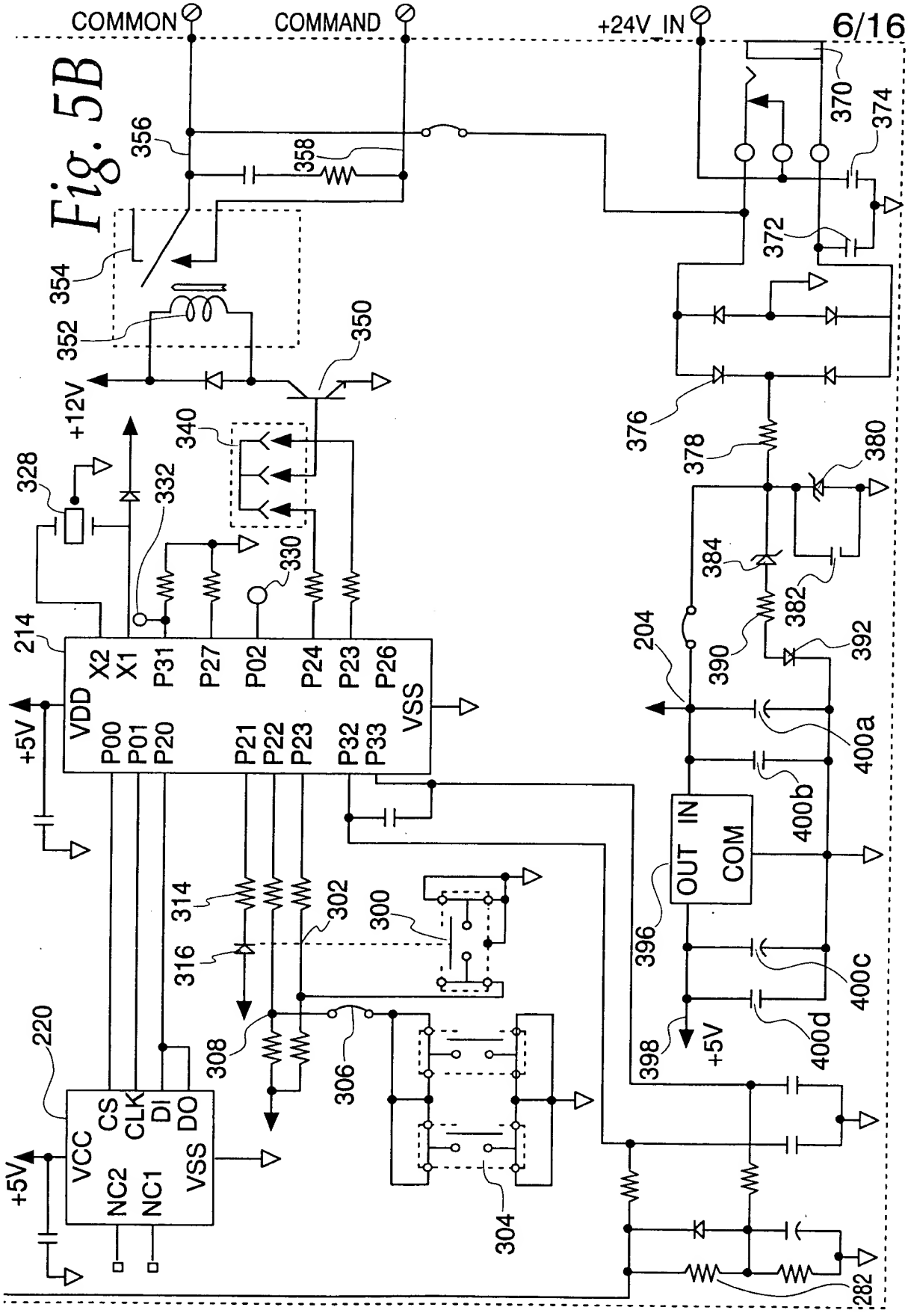
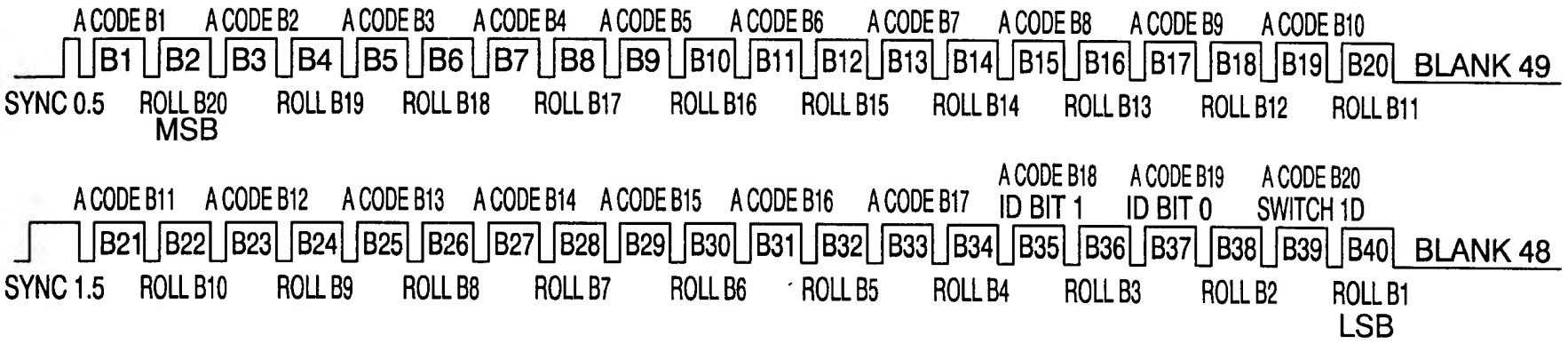
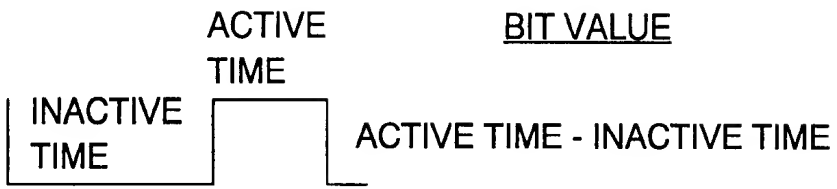


Fig. 5A

Fig. 5B


COMMON
COMMAND
+24V_IN
+12V
+5V
VDD
VSS
X2
X1
P31
P27
P02
P24
P23
P26
P00
P01
P20
P21
P22
P23
P32
P33
VCC
CS
CLK
DI
DO
NC2
NC1
OUT
IN
COM
214
220
328
330
332
340
350
352
354
356
358
370
372
374
376
378
380
382
384
390
392
204
400a
400b
400c
400d
396
398
302
304
306
308
314
316
300
282


A CODE B1
A CODE B2
A CODE B3
A CODE B4
A CODE B5
A CODE B6
A CODE B7
A CODE B8
A CODE B9
A CODE B10
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20
BLANK 49
SYNC 0.5
ROLL B20
MSB
ROLL B19
ROLL B18
ROLL B17
ROLL B16
ROLL B15
ROLL B14
ROLL B13
ROLL B12
ROLL B11
A CODE B11
A CODE B12
A CODE B13
A CODE B14
A CODE B15
A CODE B16
A CODE B17
A CODE B18
ID BIT 1
A CODE B19
ID BIT 0
A CODE B20
SWITCH 1D
B21 B22 B23 B24 B25 B26 B27 B28 B29 B30 B31 B32 B33 B34 B35 B36 B37 B38 B39 B40
BLANK 48
SYNC 1.5
ROLL B10
ROLL B9
ROLL B8
ROLL B7
ROLL B6
ROLL B5
ROLL B4
ROLL B3
ROLL B2
ROLL B1
LSB


ACTIVE TIME
BIT VALUE
INACTIVE TIME
ACTIVE TIME - INACTIVE TIME

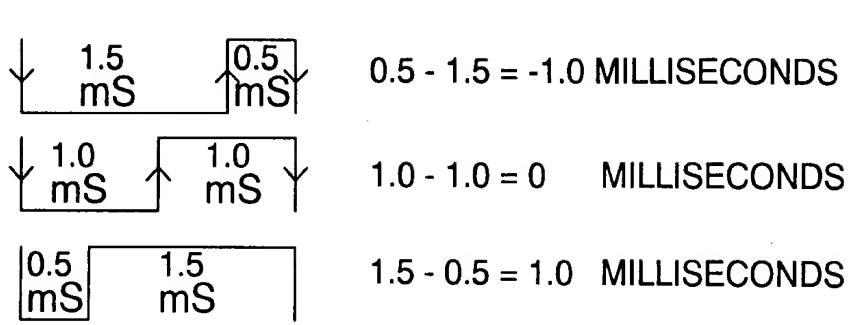

BIT TIMING
1.5 mS
0.5 mS
0.5 - 1.5 = -1.0 MILLISECONDS
1.0 mS
1.0 mS
1.0 - 1.0 = 0 MILLISECONDS
0.5 mS
1.5 mS
1.5 - 0.5 = 1.0 MILLISECONDS

Fig. 6

Fig. 7A

Fig. 7B

Fig. 7C

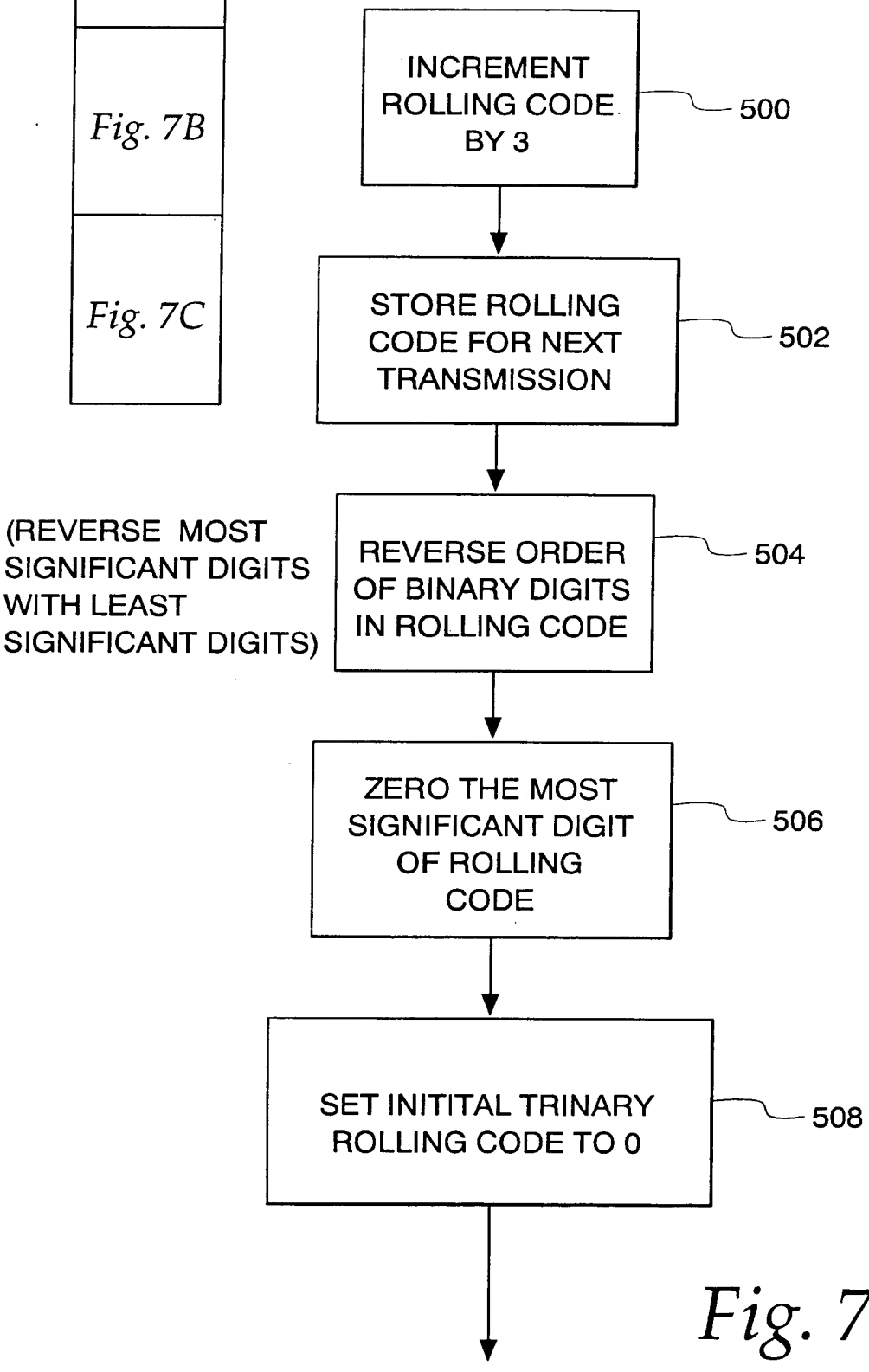


Fig. 7A

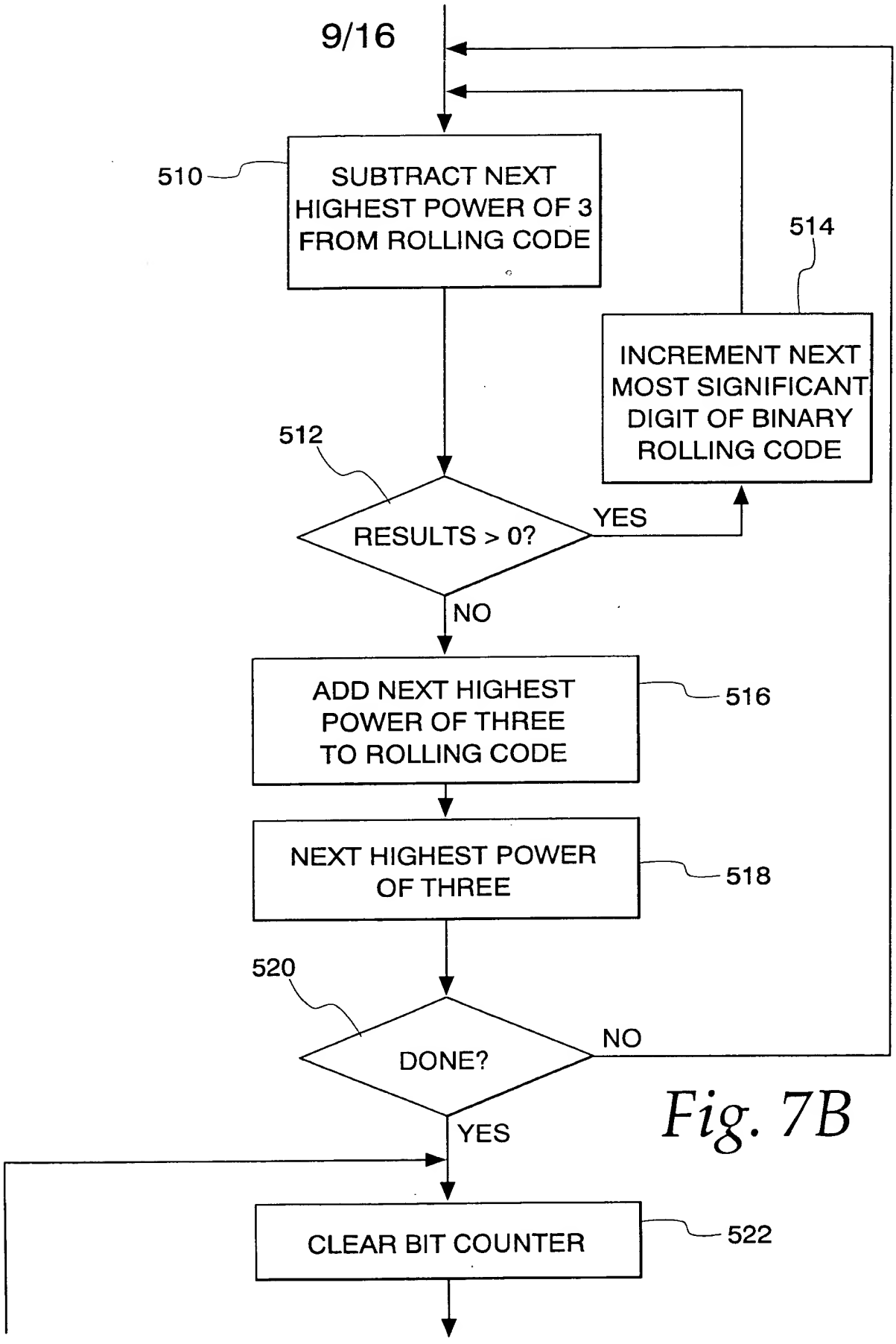

510
SUBTRACT NEXT HIGHEST POWER OF 3 FROM ROLLING CODE
514
INCREMENT NEXT MOST SIGNIFICANT DIGIT OF BINARY ROLLING CODE
512
RESULTS > 0?
YES
NO
ADD NEXT HIGHEST POWER OF THREE TO ROLLING CODE
516
NEXT HIGHEST POWER OF THREE
518
520
DONE?
NO
YES
CLEAR BIT COUNTER
522

Fig. 7B

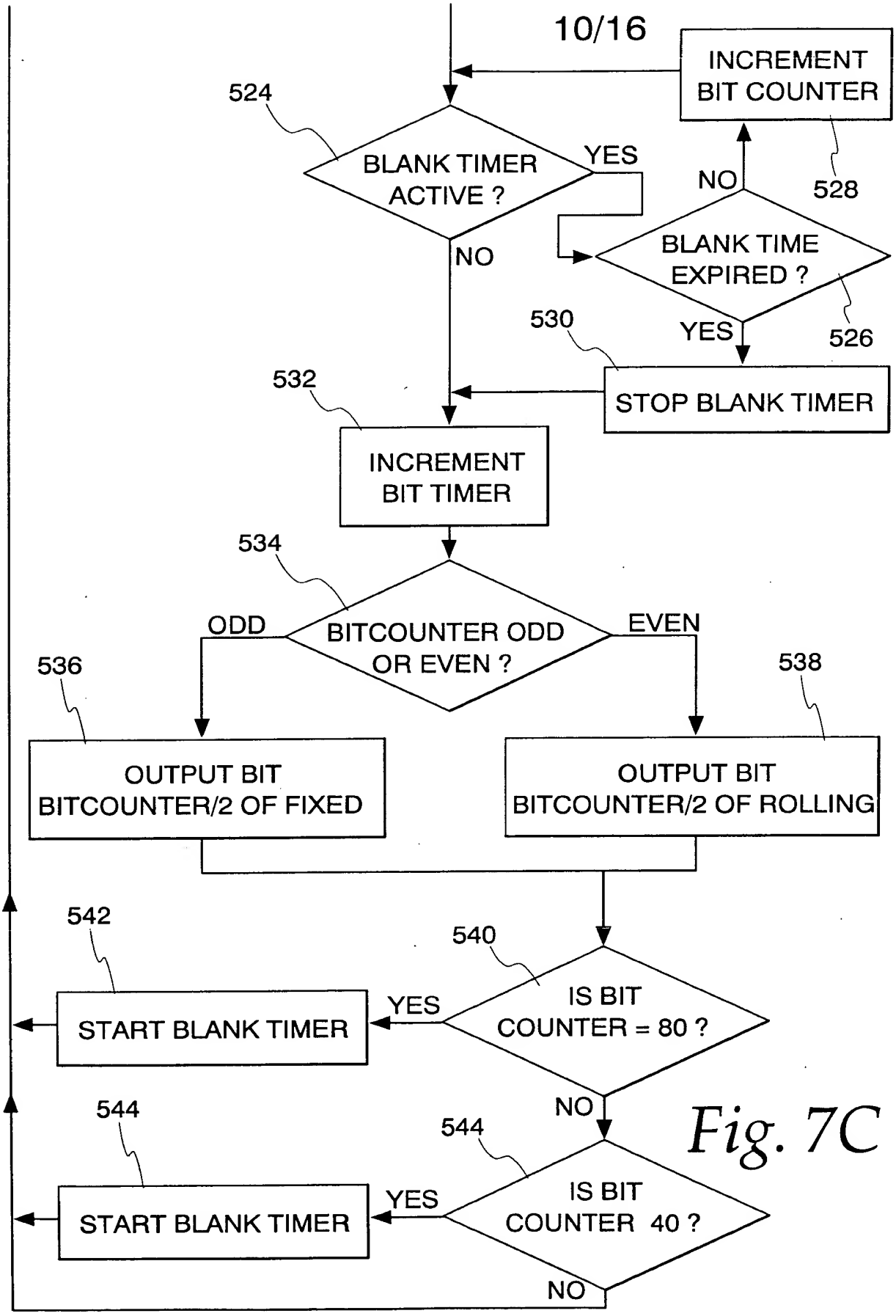

INCREMENT BIT COUNTER
528
524
BLANK TIMER ACTIVE ?
YES
NO
BLANK TIME EXPIRED ?
526
530
YES
STOP BLANK TIMER
532
INCREMENT BIT TIMER
534
BITCOUNTER ODD OR EVEN ?
ODD
EVEN
536
538
OUTPUT BIT BITCOUNTER/2 OF FIXED
OUTPUT BIT BITCOUNTER/2 OF ROLLING
542
540
START BLANK TIMER
YES
IS BIT COUNTER = 80 ?
NO
544
544
START BLANK TIMER
YES
IS BIT COUNTER 40 ?
NO

Fig. 7C

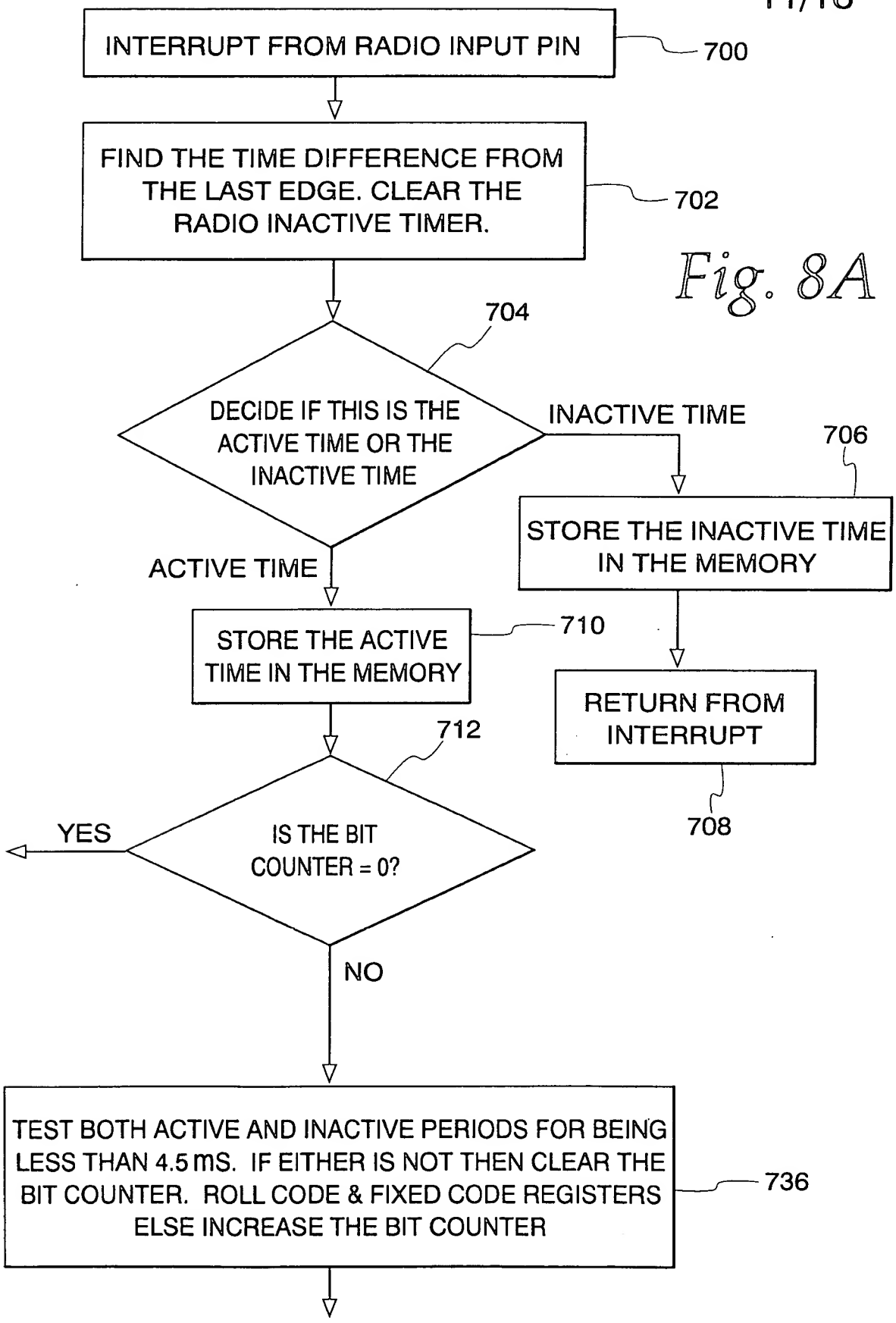
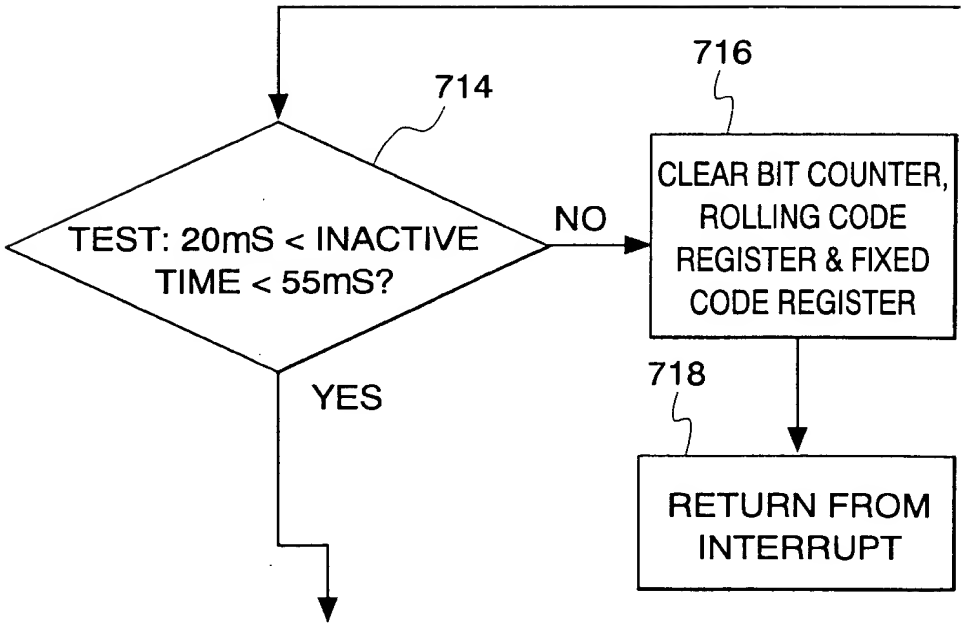

INTERRUPT FROM RADIO INPUT PIN
700
FIND THE TIME DIFFERENCE FROM THE LAST EDGE. CLEAR THE RADIO INACTIVE TIMER.
702
704
DECIDE IF THIS IS THE ACTIVE TIME OR THE INACTIVE TIME
INACTIVE TIME
706
STORE THE INACTIVE TIME IN THE MEMORY
ACTIVE TIME
STORE THE ACTIVE TIME IN THE MEMORY
710
RETURN FROM INTERRUPT
708
712
YES
IS THE BIT COUNTER = 0?
NO
TEST BOTH ACTIVE AND INACTIVE PERIODS FOR BEING LESS THAN 4.5 mS. IF EITHER IS NOT THEN CLEAR THE BIT COUNTER. ROLL CODE & FIXED CODE REGISTERS ELSE INCREASE THE BIT COUNTER
736

Fig. 8A

Fig. 8B	Fig. 8A
Fig. 8C	Fig. 8D
	Fig. 8E
	Fig. 8F

Fig. 8B



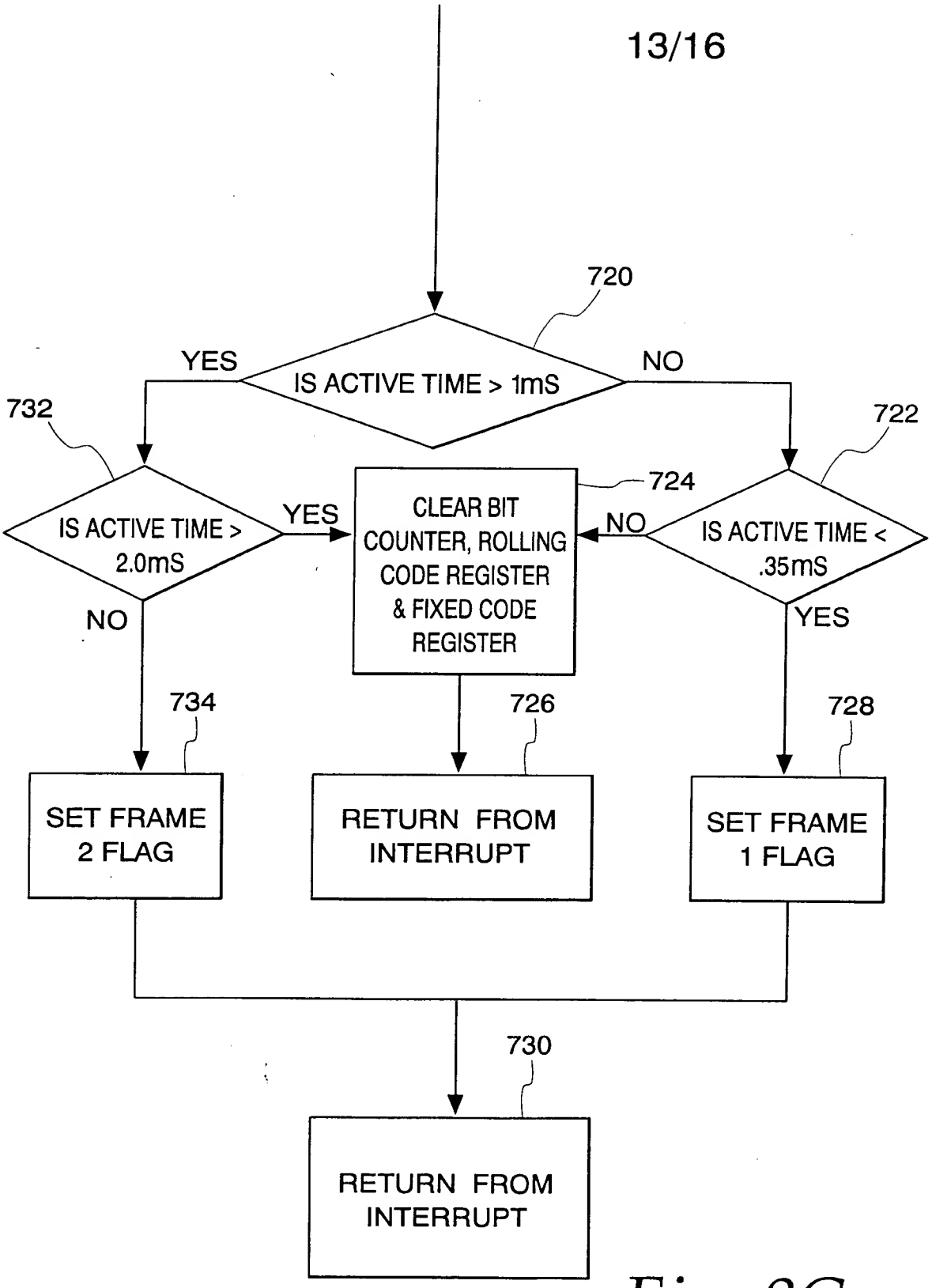

720
IS ACTIVE TIME > 1mS
YES
NO
732
722
IS ACTIVE TIME > 2.0mS
YES
724
CLEAR BIT COUNTER, ROLLING CODE REGISTER & FIXED CODE REGISTER
NO
IS ACTIVE TIME < .35mS
NO
YES
734
726
728
SET FRAME 2 FLAG
RETURN FROM INTERRUPT
SET FRAME 1 FLAG
730
RETURN FROM INTERRUPT

Fig. 8C

Fig. 8D

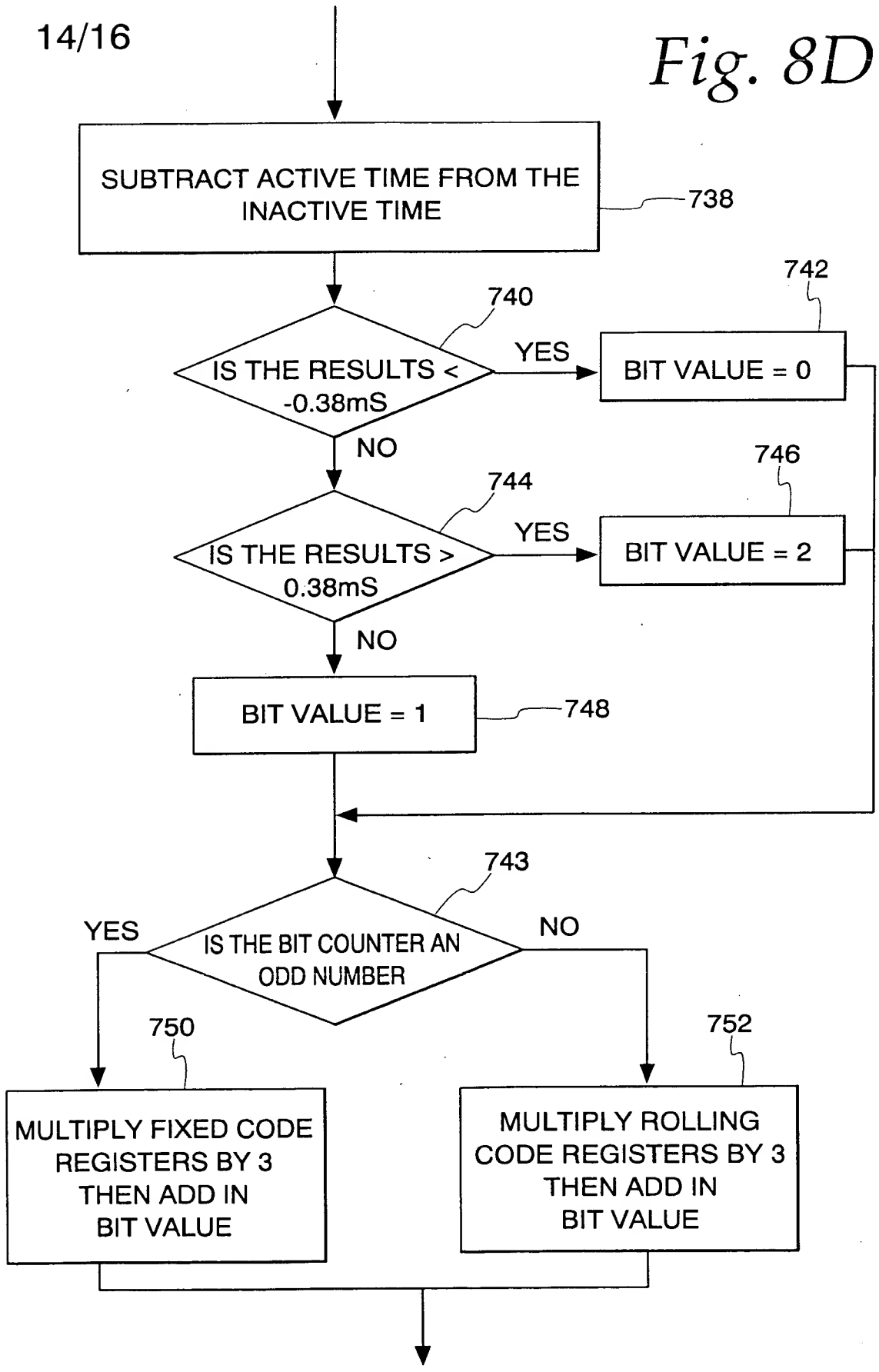
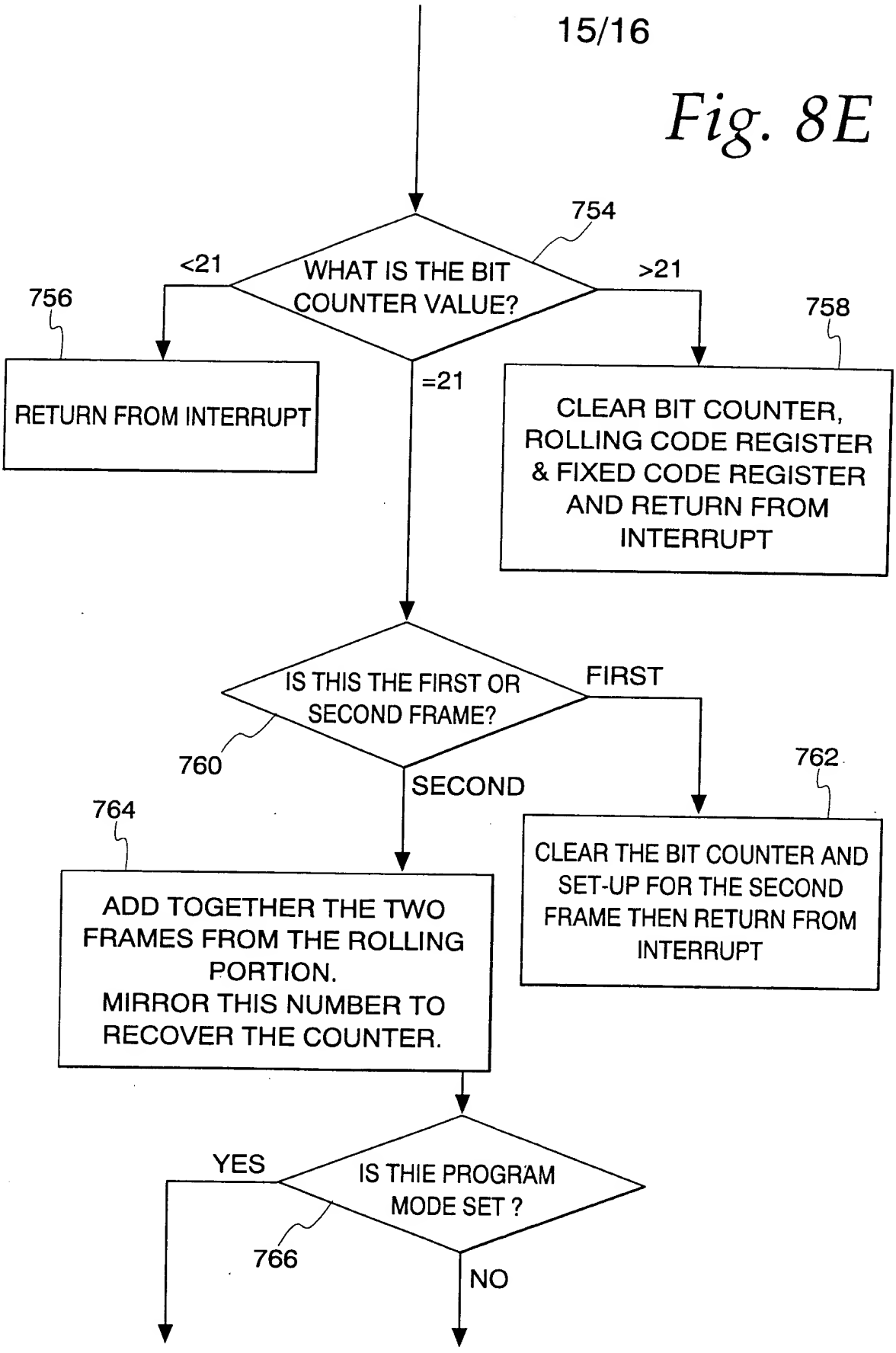

SUBTRACT ACTIVE TIME FROM THE INACTIVE TIME
738
740
IS THE RESULTS < -0.38mS
YES
742
BIT VALUE = 0
NO
744
IS THE RESULTS > 0.38mS
YES
746
BIT VALUE = 2
NO
BIT VALUE = 1
748
743
IS THE BIT COUNTER AN ODD NUMBER
YES
NO
750
MULTIPLY FIXED CODE REGISTERS BY 3 THEN ADD IN BIT VALUE
752
MULTIPLY ROLLING CODE REGISTERS BY 3 THEN ADD IN BIT VALUE

Fig. 8E


754
WHAT IS THE BIT COUNTER VALUE?
<21
>21
=21
756
RETURN FROM INTERRUPT
758
CLEAR BIT COUNTER, ROLLING CODE REGISTER & FIXED CODE REGISTER AND RETURN FROM INTERRUPT
IS THIS THE FIRST OR SECOND FRAME?
FIRST
SECOND
760
762
CLEAR THE BIT COUNTER AND SET-UP FOR THE SECOND FRAME THEN RETURN FROM INTERRUPT
764
ADD TOGETHER THE TWO FRAMES FROM THE ROLLING PORTION.
MIRROR THIS NUMBER TO RECOVER THE COUNTER.
IS THIE PROGRAM MODE SET ?
YES
NO
766

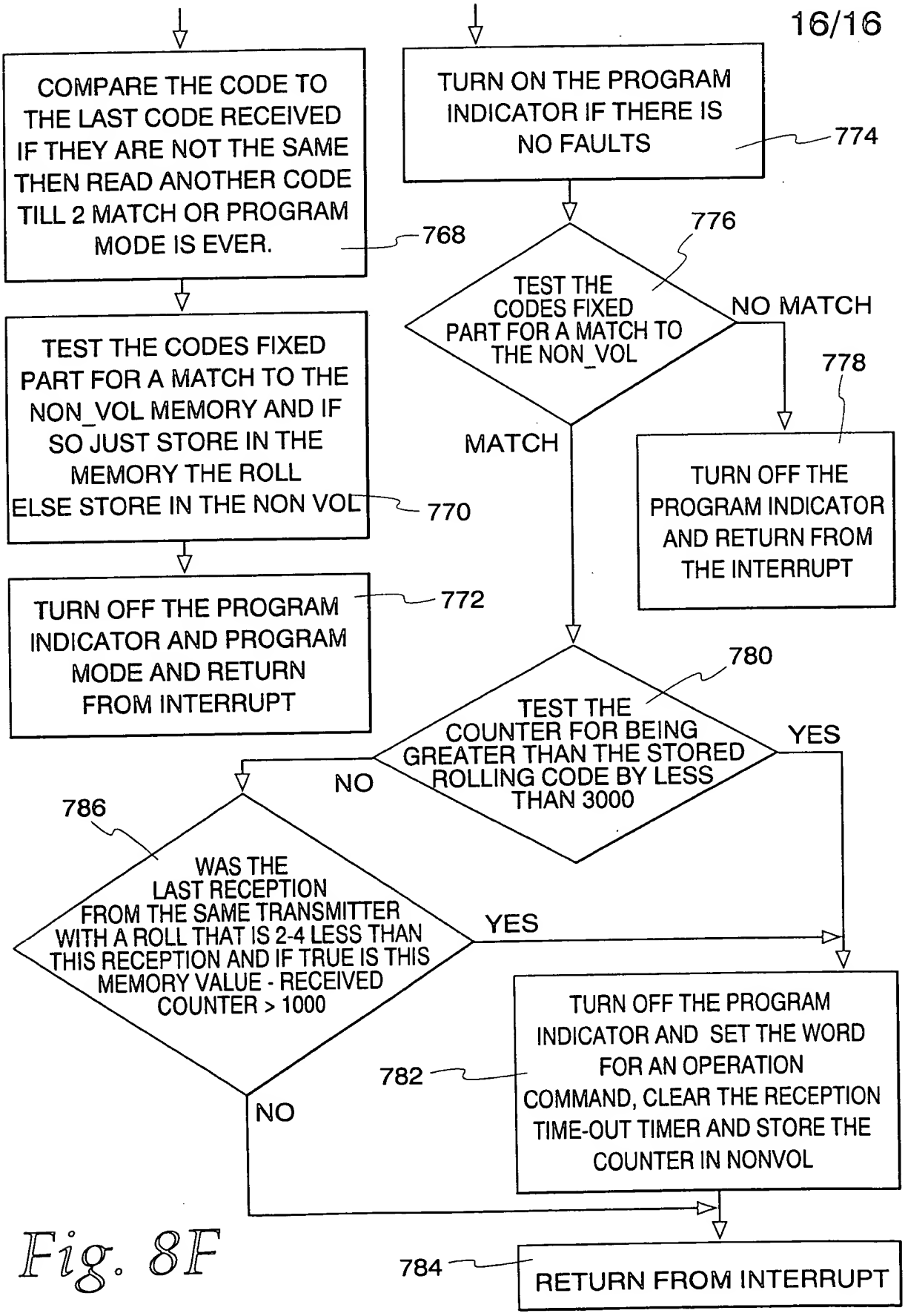

COMPARE THE CODE TO THE LAST CODE RECEIVED IF THEY ARE NOT THE SAME THEN READ ANOTHER CODE TILL 2 MATCH OR PROGRAM MODE IS EVER.
768
TEST THE CODES FIXED PART FOR A MATCH TO THE NON_VOL MEMORY AND IF SO JUST STORE IN THE MEMORY THE ROLL ELSE STORE IN THE NON VOL
770
TURN OFF THE PROGRAM INDICATOR AND PROGRAM MODE AND RETURN FROM INTERRUPT
772
TURN ON THE PROGRAM INDICATOR IF THERE IS NO FAULTS
774
TEST THE CODES FIXED PART FOR A MATCH TO THE NON_VOL
776
NO MATCH
MATCH
TURN OFF THE PROGRAM INDICATOR AND RETURN FROM THE INTERRUPT
778
TEST THE COUNTER FOR BEING GREATER THAN THE STORED ROLLING CODE BY LESS THAN 3000
780
YES
NO
WAS THE LAST RECEPTION FROM THE SAME TRANSMITTER WITH A ROLL THAT IS 2-4 LESS THAN THIS RECEPTION AND IF TRUE IS THIS MEMORY VALUE - RECEIVED COUNTER > 1000
786
YES
NO
TURN OFF THE PROGRAM INDICATOR AND SET THE WORD FOR AN OPERATION COMMAND, CLEAR THE RECEPTION TIME-OUT TIMER AND STORE THE COUNTER IN NONVOL
782
RETURN FROM INTERRUPT
784

Fig. 8F